PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of

Seiji UMEMOTO

Appln. No.: 09/695,306

Confirmation No.: 1186

Filed: October 25, 2000

Docket No: Q61458

Group Art Unit: 2875

Examiner: Jacob Y. CHOI

For: PLANE LIGHT SOURCE UNIT AND REFLECTION TYPE LIQUID-CRYSTAL DISPLAY DEVICE

SUBMISSION OF APPEAL BRIEF

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an Appeal Brief. A check for the statutory fee of $340.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

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23373
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Date: October 8, 2004

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37

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Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellant submits the following:

I. REAL PARTY IN INTEREST

Based on information supplied by Appellant and to the best knowledge of the Appellant's legal representative, the real party in interest is the assignee, NITTO DENKO CORPORATION, by virtue of an Assignment recorded on October 25, 2000 at Reel 011266, Frame 0006.

II. RELATED APPEALS AND INTERFERENCES

There are no other related appeals or interferences known to Appellant, Appellant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending Appeal.

III. STATUS OF CLAIMS

Claims 1-12 are all the claims pending in the application. Claims 2-4, 6-8, 11 and 12 are allowed. Claims 1, 5, 9 and 10 stand finally rejected and are the subject of this appeal.

Claims 1, 5, 9 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yang et al. (USP 6,323,919) in view of Sonehara (USP 4,870,484).

IV. STATUS OF AMENDMENTS

No proposed amendments have been made after the final Office action dated April 16, 2004 ("final Office action"). Therefore, all amendments to the claims, which have been made during the prosecution of the present application, have been entered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

To assist in understanding the claimed invention, Applicant provides the following discussion of certain problematic conventional methods and a concise explanation of the claimed invention.

The subject matter of claim 1, the only independent claim involved in this appeal, is directed to a plane light source unit that can form a reflection type liquid-crystal display device which is excellent in light utilizing efficiency and brightness and which is easy to view. (Page 1, lines 6-9).

As described in the specification, a plane light source unit that permits a reflection type liquid-crystal display device to be viewed while in dark surroundings is in great demand. The inventor of the present invention has previously attempted to apply a front-lighting system in which a back lighting type plane light source unit to be used in a transmission type liquid-crystal display device was disposed on the viewing side of a liquid crystal cell. Such a back-lighting type plane light source unit uses a light pipe provided with a light output means so that light incident on a side surface thereof exits from one of the upper and lower surfaces through the light output means. In the front-lighting system, the contents of the display are viewed through the light pipe. (Page 1, line 14 through Page 2, line 1).

In the above-described background-art plane light source unit using such a back-lighting type light pipe, however, there was a problem in that it was difficult to put the plane light source unit into practical use because of a shortage of clarity owing to a remarkable disorder of a display image through the light pipe in addition to a shortage of contrast at the time the plane light source unit is switched ON, and a shortage of brightness at the time the plane light source unit is switched OFF. The shortage of contrast and the disorder of the display were mainly caused by scattering of display light through a diffusing layer, or the like. (Page 2, lines 2-12).

Thus, in consideration of the above-described problematic method, the present inventor further produced a plane light source unit which can suppress production of scattered light and

the inventor attempted to prevent the shortage of contrast and disorder of display by applying the plane light source unit to a front-lighting system. (Page 2, lines 13-17). In this case, however, a difference between brightness and darkness occurred in the plane light source because a luminance leveling effect owing to scattering of light was lost. Hence, it was found that dark portions were formed causing a problem that parts of the display image were missed. (Page 2, lines 18-22).

Accordingly, an object of the invention is to develop a plane light source unit that can be adapted for a front-lighting system and can form a reflection type liquid-crystal display device which is excellent in contrast when viewed when the plane light source unit is switched OFF and the plane light source unit is switched ON and, further, which is excellent in brightness of display and in clarity because disorder of a display image through a light pipe is prevented, and which does not generate any missed parts in the display image.

As illustrated in one exemplary embodiment, as shown in FIG. 1, the linear light source 12 has an effective light emission region that is longer than an incidence side surface 11c and which is used to prevent the production of shade. (Page 20, lines 14-16).

That is, if the length of the linear light source is short, even when the length is in the order of millimeters (mm), the quantity of incident light in end portions of the light pipe becomes so small that uneven light emission may occur or a non-emission region may be produced. Hence, very clear shade may be produced when the plane light source unit is switched ON, so that the display becomes very hard to view. Thus, the linear light source 12 having an effective light emission region longer than the incidence side surface 11c is used for preventing these problems. (Page 20, lines 17-25).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1, 5, 9 and 10 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yang et al. (USP 6,323,919) in vie of Sonehara (USP 4,870,484).

VII. ARGUMENTS

Independent claim 1 recites:

> A plane light source unit comprising:
> a light pipe including an upper surface, a lower surface, and an incidence side surface, and including a light output means formed in said upper surface so that light incident on said incidence side surface exits from said lower surface through said light output means while light incident on said lower surface is transmitted through said upper surface; and
> a linear light source disposed on said incidence side surface of said light pipe, said linear light source having an effective light emission region which is longer than a longitudinal length of said incidence side surface,
> whereby information light generated on the lower surface of said light pipe is transmitted and made visible through the upper surface of said light pipe

Applicant submits that the cited references to Yang et al. and Sonehara fail to teach or suggest a linear light source having an effective light emission region which is longer than a longitudinal length of an incidence side surface of a light pipe, as claimed.

Yang et al. discloses a front lighting system. One important difference between Yang et al. and the present invention, however, is that in Yang et al. there is no disclosure of an effective light emission region which is longer than a longitudinal length of an incidence side surface of the light pipe. This fact is acknowledged by the examiner. (See, bottom of page 2 of the Final Office Action dated April 16, 2004).

The examiner alleges, however, that this important feature that is missing in Yang et al. would have been obvious in view of Sonehara. Applicant disagrees for the following reasons.

Initially, Sonehara does not explicitly disclose a light source that has an effective light emission region that is longer than a longitudinal length of an incidence side surface of a light pipe. Furthermore, Sonehara does not anywhere contemplate the advantages of such a structure, i.e., to prevent the shaded region discussed in the present application. The examiner relies on FIG. 9A as disclosing this feature. However, the fluorescent tube 7 shown in FIG. 9A of Sonehara does not necessarily, and for reasons discussed below most likely does not, have a longer effective light emission region than the side of guide plate 8. Nothing in the attendant discussion of FIG. 9A, i.e., column 6, lines 59-68, mentions the effective light emission region of tube 7.

Typically, in products such as a flat-panel display such as the one disclosed in Sonehara, the light pipe and the lamp module are provided so that they have the same length, in view of the outer dimension of the display. In that case, the non light emission regions are formed at both ends of the lamp module, e.g., fluorescent tube 7, due to rubber bushings for protecting the lamp electrodes.

Referring to FIG. 9A of Sonehara, the lamp module, i.e., fluorescent tube 7, appears to be a hot cathode fluorescent tube since it has two terminals, one at either end; a cold cathode fluorescent tube would only have one terminal. The hot cathode fluorescent tube 7 has to be provided with an electrode and a heater for making electrons fly by heating. Therefore, the non-light emission region of fluorescent tube 7 is necessarily longer and, thus, the light emission region in the light source of Sonehara is not clearly longer than the light pipe, as asserted.

Moreover, Sonehara is not directed to a front-lighting system, as is the claimed invention and the device disclosed in Yang et al. To the contrary, Sonehara discloses a back-lighting system similar to the problematic system discussed in the background section of the present application. Accordingly, even if a skilled artisan were motivated to try to combine the respective features from Yang et al. and Sonehara, as proposed by the examiner, the combination would not be possible and the result would depart from the intended purposes of the two combined devices.

Further, even if one were to assume, *arguendo*, that combining the two lighting systems of Yang et al. and Sonehara were possible, by suitably adjusting the respective structures, and further assuming that Sonehara disclosed a light source having an effective light emission region that is longer than a longitudinal length of an incidence side surface of a light pipe, as the examiner alleges, a skilled artisan would not have been motivated to selectively apply the linear light source of Sonehara to the front-lighting system of Yang et al.

Specifically, prevention of shade, as explicitly discussed in the present application, is never contemplated in Yang et al. or Sonehara. Because no shade appears in a back-lighting system due to light diffusion at the reflective layer, which is a well-known feature of back-lighting systems, Sonehara would not have been considered by a skilled artisan presented with the problems addressed by the present application, i.e., the prevention of shade in a front-lighting system.

The examiner asserts that the proposed combination of features from Yang et al. and Sonehara would have been obvious "to utilize a more stable and uniform effective light emission region...". This reasoning contradicts the express teachings of the asserted references, however,

due to the light diffusion inherent in back-lighting systems. Because the light is diffused in back-lighting systems, the length of the light source region, or the length of non-light emission region, is not of particular concern. In fact, in typical back-lighting systems the effective light emission region tends to be shorter than the light pipe, as discussed above.

Furthermore, light diffusion, as is inherent in back-lighting systems such as disclosed in Sonehara, cannot be utilized in a front-lighting system, such as the one disclosed in Yang et al., because it is required to output the light to contain an image, e.g., information light. If the light forming image light (information light) is diffused, the contrast of the image decreases. In order to provide uniform light, the diffusion of light is important in back-lighting systems in order to cancel the influence of the non-light emission region of several millimeters. On the other hand, light diffusion is fatal in a front-lighting system such as an LCD, that has image elements of about 0.2 mm.

For all of the above reasons, Applicant respectfully submits that the proposed combination of Yang et al. and Sonehara would not result in the invention claimed in at least independent claim 1 and, furthermore, that the proposed combination of references would not have been obvious to one of ordinary skill in the art. Accordingly, it is respectfully requested that the §103 rejection of independent claim 1 and dependent claims 5, 9 and 10, which all depend from claim 1, be overturned.

VIII. CONCLUSION

Unless a check is submitted herewith for the fee required under 37 C.F.R. §1.192(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

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Registration No. 46,075

Date: October 8, 2004

Attorney Docket No.: Q61458

CLAIMS APPENDIX

CLAIMS 1, 5, 9 AND 10 ON APPEAL:

1. A plane light source unit comprising:

a light pipe including an upper surface, a lower surface, and an incidence side surface, and including a light output means formed in said upper surface so that light incident on said incidence side surface exits from said lower surface through said light output means while light incident on said lower surface is transmitted through said upper surface; and

a linear light source disposed on said incidence side surface of said light pipe, said linear light source having an effective light emission region which is longer than a longitudinal length of said incidence side surface,

whereby information light generated on the lower surface of said light pipe is transmitted and made visible through the upper surface of said light pipe.

5. A reflection type liquid-crystal display device comprising a plane light source unit according to claim 1, and a liquid-crystal cell disposed on a lower surface of said plane light source unit, said liquid-crystal cell including a reflection layer.

9. A plane light source unit according to claim 1, wherein the information light on the lower surface of said light pipe is constituted by an image and the image is visibly transmitted and made visible through the upper surface of said light pipe.

10. A plane light source unit according to claim 9, wherein the image is provided by a liquid crystal cell, which is provided separately from said light pipe.

EVIDENCE APPENDIX

No evidence has been submitted pursuant to 37 C.F.R. § 41.37(c)(1)(ix), 37 C.F.R. §§ 1.130, 1.131, or 1.132. Additionally, no other evidence has been entered by the Examiner and relied upon by Appellant in the appeal.